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DOCUMENTS SECTION

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Mare Island, Vallejo, California

1 September 1948

To: Medical Officer in Command

Subj: Monthly Report of the Experimental Work of the Artificial Limb Department.

Ref: (a) Advisory Committee on Artificial Limbs ltr dtd 21 June 1948. *Aug.*

1. Monthly report required by reference (a) is hereby submitted.

2. Mr. William C. Oliver's application for a P-6 Orthopedic Technologist has been accepted and he has been placed on the civil service payroll as of 1 September 1948.

3. The following projects are under production, experimentation and further study:

(a) Lower Extremities Section

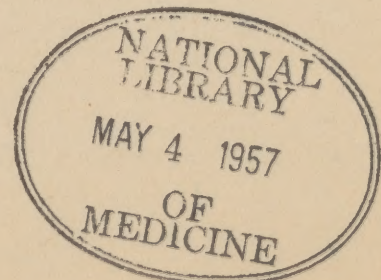
I. Foot and Ankle

The functional ankle joint utilizing a spherical contact bearing and single rubber bumper is being redesigned in order to bring the axis of the metal joint in line with the center zone of the rubber block. The bolt utilized in the ankle joint which was made of mild steel broke on the accelerated testing machine at the University of California and a new bolt is being made utilizing 43B-14 high carbon steel.

The functional ankle utilizing a single cable is also being redesigned to permit a joint at the attachment of the cable at the base of the foot. A wooden ankle block incorporating the shin block has been built into a single piece and the plastic shin built directly over it. This will tend to give a better cosmetic appearance at the ankle thereby eliminating the glued section. Metal dies are contemplated in order to manufacture the ankle block out of metal as a substitute for the wood.

II. Shank

A plastic shank is being constructed utilizing one layer of fortisan stockinette, two layers of fibre glass and an additional layer of Fortisan overall. A heavy piece of fibre glass is used in substitution of an aluminum insert in the area where rivets are placed.



III. Knee

A. Mechanical

The functional above knee joint is being redesigned to utilize a solid bolt and post. This will eliminate the screw and bolt in this section which continued to loosen on the older model. A set of BK joints have been constructed utilizing a frame and a wheel eccentrically and revolvably carried by the frame and an annulus revolvably mounted around the wheel. This joint allows the axis to travel posteriorly and superiorly matching the axis and its travel that occurs in the normal knee joint on bending. It is hoped that this joint will allow the stump to remain in the socket and overcome the undesirable feature of the simple hinged joint which pries the stump out of the socket on flexion.

B. Hydraulic

Work is continuing on the hydraulic AK knee joint in conjunction with the tilting table prosthesis.

IV. Cosmetic Problem

Shins have been covered with a $\frac{1}{4}$ " flesh colored sponge rubber and sprayed with natural Latex. The Latex gives a tough, durable skin. It is necessary to introduce pigments to the Latex in order to control the individual shades in matching the opposite leg. A glossy sheen results when the Latex is cured which is undesirable. It is contemplated to utilize an inert substance in the Latex to reduce the gloss or buffing the finished product. Sta-Bond C-111 is finally sprayed over the Latex in order to give a preservative coating overall. It is hoped that the entire prosthesis from the toe to the knee can be covered with a continuous Latex skin thereby making the prosthesis dust proof and waterproof and giving an effective cosmetic appearance to the whole.

V. Brief Summary of status of models as a unit.

A. number of below knee prostheses utilizing suction sockets have been fitted successfully. A suction socket unit has been fitted to an amputee with Burger's disease. The stump is being carefully evaluated in order to determine if the below knee suction socket will improve or decrease the circulation of the stump. An additional unit is being constructed incorporating the cosmetic covering.

Various flexible plastics are being investigated as a substitute for the horsehide liner for the below knee socket.

Studies are continuing regarding securing a better impression method in the sitting and standing positions in order to secure better fits. A series of x-rays of the knee joint in various positions has been taken and by superimposing the series it is noted that the patella is displaced posteriorly about one inch on flexion of the knee. This accounts for the gapping of space that occurs just below the patella and the anterior rim of the socket. If the socket is constructed with the elimination of this space with the knee flexion at 90° excessive pressure occurs below the patella and on the infra-patella tendon when the amputee's stump is straightened and is under weight bearing.

Various types of impression materials are under investigation.

Parts of the hydraulic tilting table prosthesis are still under construction.

(B) Upper Extremities Section

I. Arms

A Robin-Aid wrist flexion unit is being worn by a unilateral below elbow amputee who reports the unit is working successfully and he finds a great many daily uses for it.

The functional elbow joint has been redesigned utilizing a left and right hand thread on each end of the cable. This allows the center section to be threaded simulataneously into the stays which had previously been incorporated in the plastic forearm shell and biceps cuff.

II. Hands, Hooks, and Tools.

Work is continuing in the field testing of the Robinson hand and cosmetic glove.

III. Cosmetic Problem

The methods and material used in the cosmetic leg covering are applicable to the arm covering.

IV. Harness and/or other outside control.

Studies are being carried on with the shoulder harness in order to utilize only a single strap around the opposite shoulder.

V. Brief Summary of status of models as a unit.

Below elbow suction sockets are being fitted with a soft socket and with no allowance of space at the end of the stump. A hole through the socket is made which allows the amputee to place his stump at the bottom of the socket and then the hole is closed by a slide cover place externally. This provides suction to the prosthesis and although the amount of negative pressure is not as great as occurs in a leg, the socket is retained on the stump with considerable effect because the full skin area of the stump is being utilized.

A number of cases have been fitted with above elbow suction sockets and are working satisfactorily.

The Robin-Aid above elbow arm and automatic elbow lock has been fitted to an amputee and is undergoing amputee testing.

An amputee with hemisection of the scapula and clavicle is being fitted with the Navy Fitch arm.

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